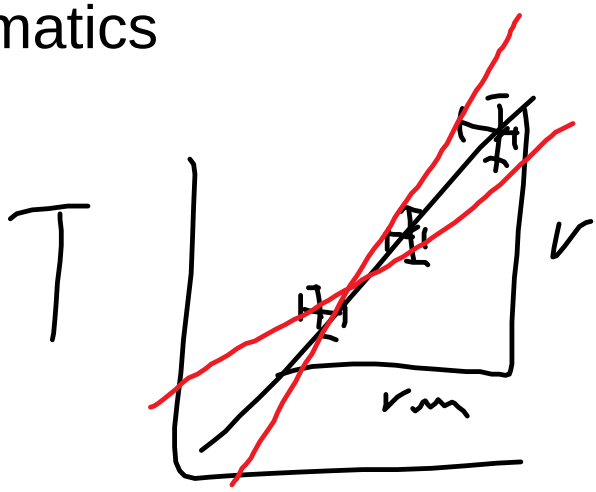
Lab recap kinematics



$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{2.2\text{s} - 0.4\text{s}}{1.0\sqrt{\text{m}} - 0.2\sqrt{\text{m}}}$$

$$\sqrt{L}\ (\sqrt{\text{m}}) = \frac{1.8\ \text{s}}{0.8\ \sqrt{\text{m}}}$$

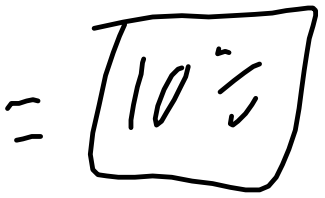
$$= 2.25\ \frac{\text{s}}{\sqrt{\text{m}}}$$

$$\pm 0.2\ \text{s}/\sqrt{\text{m}}$$

$$\text{slope} = 2.2 \pm 0.2\ \frac{\text{s}}{\sqrt{\text{m}}}$$

$$T = 2.2 \pm 0.2\ \frac{\text{s}}{\sqrt{\text{m}}}\sqrt{L} + 0.1\ \text{s}$$

$$\%\ \text{error} = \left|\frac{2.2 - 2.0}{2.0}\right| \times 100\%$$



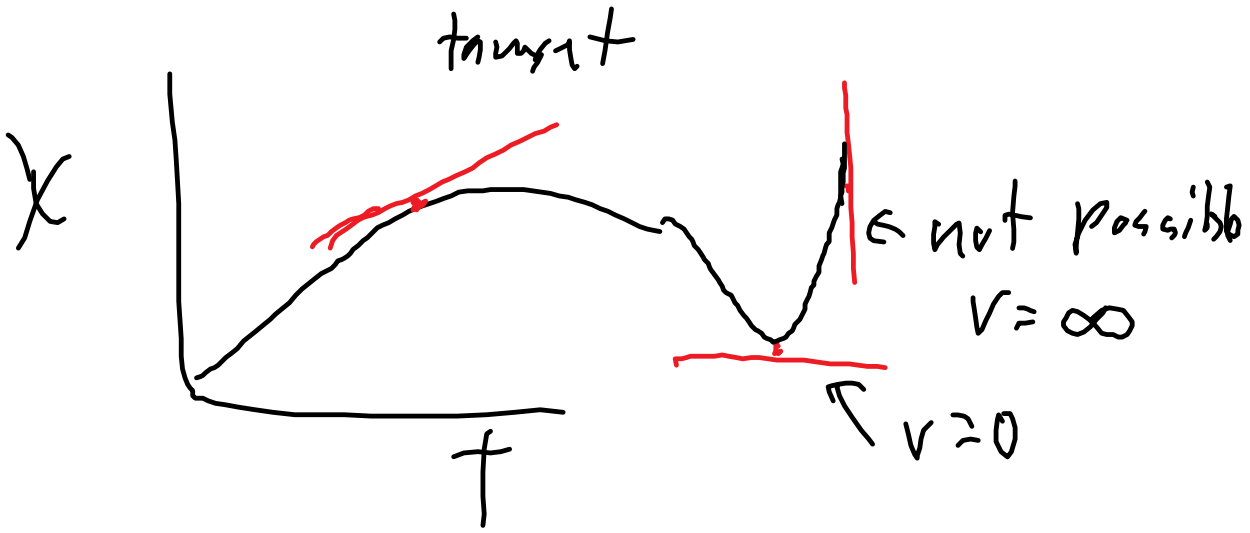
Kinematics:
describing motion
distance or length, d or x? or L,
definition - the space between two points or the total space travelled
units: metre, m
scalar - it has no direction

position, x
definition where you are relative to something - a reference point
units: metre, m and degrees for the angle or radians = 360degrees = 2pi radians
vector - include direction

displacement, IB symbol is s most books use d
the change in position
vector - include direction
wave - displacement of the medium - x, the distance the medium moves from equilibrium
vector - include direction

velocity - v,
define - the rate of change in position
$v = \Delta x/\Delta t$ - slope of the x-t graph

if the x-t graph is curved, the instantaneous velocity is the slope of the tangent line to the curve.
tangent line - the line that touches one point showing the trend of the curve.



average velocity is the total displacement /total time
$v_{avg} = s/t$

if the velocity is constant, the $v = v_{avg} = s/t$

eg.
Boaz starts at the track, 100 m West of the school and runs 6 laps (of the 400m track) in 10 minutes 15seconds. Determine

a) his initial position
b) his final position
c) his distance travelled
d) his displacement

e) his average speed
f) his average velocity
g) his instantaneous velocity at halfway when he is going North.

a) 100m west of the school
b) 100 m west of the school
c) 6x400=2,400 m
d) xf-xi = 0
e) vavg = d/t = 2400/(615)=3.9024 =3.9m/s speed
f) v=0
g) not enough information
assume constant speed, then v=3.9m/s North

v